SECTION 6

CONCRETE FINISHING AND CURING

6-1 SPECIFICATION REVIEW FOR CONCRETE DECK FINISHING

6-1.1 GENERAL SPECIFICATIONS

Section 51-1.17 of the Standard Specifications pertains to deck finishing. They are "end result specifications." In other words, the specifications require that bridge decks meet certain qualitative criteria before they will be acceptable. Keep in mind that the contractor is free to use virtually any method he thinks is appropriate to achieve a deck that meets the requirements of the specifications.

The general criteria for bridge decks are as follows:

1. Decks will meet the specified requirements for smoothness in the longitudinal direction as measured by the bridge profilograph and smoothness transversely as measured by a 12 foot straight edge.
2. Decks will have a surface crack intensity limit based on crack size and frequency. Any cracks exceeding this criteria are required to be pressure injected with epoxy.
3. Decks will have a surface texture which will provide a minimum specified friction coefficient of 0.35.
4. Deck joints, if needed, will be placed at locations approved by the Engineer.

5. The concrete for decks shall be at least 7 sack concrete and meet all the appropriate specifications for concrete.

It should be mentioned that under the end result specifications for bridge decks, quality is the sole responsibility of the contractor.

6-1.2 SPECIFICATION HIGHLIGHTS

The following specifications are from the January 1988 Standard Specifications, Section 514.17:

1. The completed surface shall be constructed true to the required grade and cross section and to the smoothness, surface texture, and surface crack requirements specified.
2. Unless stated otherwise in the Special Provisions, the Engineer will set deck elevation control points including all camber allowances for use by the contractor to establish grade and cross section. The points shall not be closer than approximately 8 ft longitudinally and 24 ft transversely to the centerline of the bridge. (See Appendix for setting lost deck grades).
3. Prior to concrete placement, the contractor shall set to grade all rails and headers used to support the finishing equipment and shall move all finishing equipment over the entire length of the section to be placed to check steel and bulkhead clearances.

4. Surface crack intensity shall have less than 50 LF. of 0.020 in. wide cracks in any 500 sqft. of deck area. Surface crack intensity shall be measured prior to the release of falsework or prestressing. Cracks in excess of this limit shall be filled with pressure injected epoxy. Cracks to be filled shall be cleaned and filled so that all portions of the crack wider than 0.005 are completely filled with epoxy.

5. The smoothness of completed roadway surfaces of structures, approach slabs, and adjacent 50 ft of approach pavement will be tested in accordance with California Test Method No. 547. (See Bridge Construction Records and Procedures Memo 112-2.0, "Testing Bridge Deck Surfaces for Compliance with the Straightedge or Profilograph Requirements" for policy regarding communications with the contractor and other important information). The test consists of 2 profiles in each lane 3 ft from the lane lines plus one in each shoulder, 3 ft from the curb. Individual high points must be less than 0.25 in. and the profile count may be up to 5 in any 100 ft. section. The surface shall not vary more than 0.02 ft in 12 ft. transversely when measured with a straightedge. Be sure to run the profilograph in a direction parallel to traffic.

6. The contractor shall schedule the profildgraph testing with prior notification to the Engineer of at least 7 days.

7. When seal coats are called for, the deck must meet the requirements for smoothness before the seal coat is applied.
8. Surfaces to be covered by more than 1 in. of material shall not vary more than 0.03 ft. from the 12 ft. straight edge.
9. Any surfaces not meeting the smoothness criteria shall be ground. After grinding is completed, the minimum remaining cover over the reinforcing shall be l-1/2 in. In areas where you are fairly certain that grinding will occur, (around hinges and construction joints) it is wise to plan for some additional cover.
10. The deck shall have a surface texture that will develop a friction coefficient not less than 0.35.
11. Decks to receive membrane deck seals shall be finished smooth.

6-2 CURING BRIDGE DECKS

From section 90-7.03 of the 1988 Standard Specifications, "Curing Structures", the following is found: "The top surface of Highway bridge decks shall be cured by both the curing compound method and the water method, except that the curing compound shall be the ...pigmented curing compound...." In most areas of the State and in all the major metropolitan areas, water based pigmented curing compound is the only type of curing compound permitted by the Air Quality Board.

Curing compound shall be applied progressively during deck finishing operations immediately after finishing operations are completed on each individual portion of the deck. The water cure shall be applied not later than 4 hours after completion of deck finishing, or for portions of the deck completed after normal working hours, the water cure shall be applied not later than the following morning. Be sure that the curing compound is sufficiently dry and the concrete has sufficiently set before the rugs or mats are placed on the deck.

6-2.1 CURING COMPOUND

When the surface of the deck has been textured and the surface sheen is still on the concrete, curing compound should be applied. It must be applied with power operated spraying equipment that atomizes the cure. The application rate, a minimum of 200 sqft. per gallon, is specified in the Standard Specifications. Conditions during the pour, such as wind and low humidity, may require a heavier application rate. Remember, the purpose of curing compound is to prevent loss of surface moisture from the fresh concrete, so make sure that the cure is applied at the right time and coverage is complete and even.

In addition to being released by Translab, a one quart sample of the curing compound proposed for use must be taken and tested for compliance with the Standard Specifications. Before taking a sample and during its application, the curing compound must be well mixed to perform effectively. Mixing must be done with mechanical type paddle or screw agitating mixers.

6-2.2 FOGGING

During hot weather especially if it's windy and /or the humidity is low, fogging the fresh concrete deck may be necessary if the cure application is late. The contractor must begin fogging the deck immediately before the surface sheen of the concrete disappears and before surface cracks begin to appear. The purpose of fogging is to keep the concrete cool and prevent premature moisture loss and uneven shrinkage in the concrete before the cure is applied. *Fogging can be detrimental to the deck if too much water is applied and it puddles or runs off the deck and washes the fresh concrete. Fogging must also be done with the correct equipment. This means a fogging nozzle in good operating condition that adequately atomizes the water, not heavy squirting. See Bridge Construction Records and Procedures Memo 105-3 and 105-4 for additional information.

6-2.3 WATER METHOD

The water cure shall be applied not later than 4 hours after completion of deck finishing, or for portions of the deck completed after normal working hours, the water cure shall be applied not later than the following morning. The concrete shall be kept wet continuously for seven days. Cotton mats, rugs, carpets, burlene or earth or sand blankets may be used as the moisture retaining medium. Be sure that the curing compound is sufficiently dry before the rugs or mats are placed. It is recommended that the contractor wet down the deck before the rugs

or mats are placed. The moisture retaining medium must be wetted immediately after placement and kept wet for at least 7 days. Be sure to remind the contractor that consideration must be' given to the control of cure water runoff so that it doesn't interfere with traffic, erode slopes, footings or falsework pads.